CLAIMS

1. Method of obtaining a transmission gain function by means of an array of antennae, a signal to be transmitted by the array being weighted by a vector ($\overline{b_d}$) of N complex coefficients, referred to as the transmission weighting vector, N being the number of antennae in the array, the array transmitting to a telecommunication terminal over a transmission channel, referred to as the downlink channel, a downlink transmission signal (S_d) and the said terminal transmitting to the said array over a transmission channel, referred to as the uplink channel, an uplink transmission signal (S_u), the said downlink channel being disturbed by an isotropic noise (N') and/or a directional noise, referred to as the downlink interference (I_d), characterised in that the said transmission weighting vector ($\overline{b_d}$) is determined by means of a matrix product from a noise power matrix ($\mathbf{D_d}$) which is a function of the power of the said isotropic noise and/or of the power of the said directional noise and a vector ($\overline{C_d}$), referred to as the downlink channel vector, representing an angular sampling of the transfer function of the downlink channel in M directions k, k=0,...,M-1, belonging to the angular range covered by the array.

2. Method of obtaining a transmission gain function according to Claim 1, characterised in that the said downlink channel vector ($\overline{C_d}$) is obtained from variations in the transfer function of the uplink channel.

3. Method of obtaining the transmission gain function according to Claim 2, characterised in that the said downlink channel vector ($\overline{C_d}$) is obtained from variations ($\overline{\Delta C_u}$) in a vector ($\overline{C_u}$), referred to as the uplink channel vector, representing an angular sampling of the transfer function of the uplink channel in the said M directions.

4. Method of obtaining a transmission gain function according to Claim 3, characterised in that the variations ($\overline{\Delta C_d}$) in the downlink channel vector are obtained from variations ($\overline{\Delta C_u}$) in the uplink channel.

5. Method of obtaining a transmission gain function according to Claim 3 or 4, characterised in that the variations Δc_{dk} in the components c_{dk} of the downlink

channel vector ($\overline{C_d}$) are obtained by means of the variations Δc_{uk} in the components c_{uk} of the uplink vector by: $\Delta c_{dk}/c_{dk}=f_d/f_u.\Delta c_{uk}/c_{uk}$ where f_u is the frequency used on the said uplink channel and f_d is the frequency used on the said downlink channel.

6. Method of obtaining a transmission gain function according to Claim 4 or 5, characterised in that the said downlink channel vector ($\overline{C_d}$) is obtained by integrating the said variations ($\overline{\Delta C_d}$) in the said downlink channel vector and an initial value ($\overline{C_d}(0)$) transmitted by the said terminal.

7. Method of obtaining a transmission gain function according to one of the preceding claims, characterised in that the noise matrix is a diagonal matrix of size MxM and of components $\sqrt{\sigma_{dk}^2+\gamma_d N'_0/I_d}$ where σ_{dk}^2 is the power of the downlink interference in the direction k, N'_0 is the power of the isotropic noise, $\gamma_d=1/\left\|\overline{C_d}\right\|^2$ and I_d is the total power of the downlink interference.

8. Method of obtaining a transmission gain function according to one of Claims 1 to 6, characterised in that, the array transmitting over a plurality of downlink channels a plurality of transmission signals to a plurality of telecommunication terminals and receiving from them a plurality of transmission signals transmitted over a plurality of uplink channels, each downlink channel j relating to a terminal j of the said plurality being associated with a transmission weighting vector $\overline{b_d}(j)$, the second noise matrix relating to the downlink channel j is a diagonal matrix of size MxM and of components $\sqrt{\sigma_{dk}^2(j)+\gamma_d(j).N'_0/I_d(j)}$ where $\sigma_{dk}^2(j)$ is the power of the downlink interference for the downlink channel j in the direction of k, $\gamma_d(j)$ is a coefficient characterising the power transfer over the downlink channel j, N'_0 is the power of the second isotropic noise, and I_d is the total power of the downlink interference.

9. Method of obtaining a transmission gain function according to Claim 8, characterised in that the coefficient $\gamma_d(j)$ is transmitted to the array by the terminal j on the associated uplink channel.

10. Method of obtaining a transmission gain function according to Claim 8, characterised in that the coefficient $\gamma_d\ (j)$ is estimated by the base station from a coefficient (Γ) characterising the power transfer in the uplink direction.

11. Method of obtaining a transmission gain function according to one of Claims 8 to 10, characterised in that, for a given downlink channel j, the downlink interference power in the direction k, $\sigma^2_{dk}\ (j)$, is estimated according to the power of the transmitted signals $(S_d(j'))$ on the downlink channels j' distinct from j, a coefficient $\beta_d(j)$ characterising the orthogonality of the downlink channel j, the components $(g_{dk}(j'))$ of the gain vectors $(\overline{G_d}(j'))$ relating to the said distinct downlink channels j', the gain vectors consisting of an angular sampling in the said M directions of the transmission gain functions obtained for the said distinct downlink channels j'.

12. Method of obtaining a transmission gain function according to Claim 11, characterised in that the said coefficient $\beta_d(j)$ is estimated from a coefficient characterising the orthogonality of the uplink channel j.

13. Transmission device for a base station in a mobile telecommunication system, comprising an array $(40_0, 40_1, .., 40_{N-1})$ of N antennae, weighting means (41_2) for weighting the signal to be transmitted (S_d) by the said array by means of a transmission weighting vector $(\overline{b_d})$ of N complex coefficients, characterised in that it comprises means $(42_2, 44_2, 46, 47, 48)$ adapted to implement the method of obtaining the transmission gain function according to one of the preceding claims, the said adapted means supplying to the said weighting means (41_2) the said transmission weighting vector $(\overline{b_d})$.